

## THE LIFE OF CROOKES.

BY SIR OLIVER LODGE, F.R.S.

*The Life of Sir William Crookes, O.M., F.R.S.* By E. E. FOURNIER D'ALBE, D.Sc., F.Inst.P. With a Foreword by SIR OLIVER LODGE. Pp. xix + 413. (T. Fisher Unwin, Ltd.)

WHOEVER should have undertaken to write the *Life of Sir William Crookes* must have known that he was undertaking a difficult task. The amount of material available was enormous: for Crookes was a man who kept documents of every kind, probably in a state of orderly arrangement but multifarious in scope, and of very different intrinsic value. Along with papers of historical interest there were things little better than domestic memoranda, such as a list of things packed for a voyage, or a list of purchases made before coming home, or memoranda of the fees obtained for professional services, or correspondence about what sort of fee it would be reasonable to charge: any number of letters also, many of no particular interest, such as acceptances of invitations, or applications for tickets for ceremonials,—in fact, a good deal of what might legitimately be stigmatised as “rubbish.” Beside all this, however, there were letters and controversies about the discovery of thallium, attempts to deal with the cattle plague, correspondence and controversy about the radiometer, speculations and predictions about wireless telegraphy, and dealings with diamond, gold, and radium; some of these being of considerable, some of small, interest. And it must have been very difficult to decide what to include.

One result, perhaps an unfortunate result, of the biographer's decision to include a large number of trivial documents is that methods of abstracting gold, in one form or another, loom rather large throughout the volume, and are continually occurring; sometimes in the domain of chemistry, sometimes approaching the realm of high finance, but rather frequently in

the petty details of business economy and company speculations. The biographer's aim no doubt is to produce a composite portrait, and not to slur over anything that throws light upon the character of his subject; but it may be held that the result is rather unfortunate. Trivial things occur in the lives of all men, but they are usually taken for granted, not emphasised or given a permanent position in biography; so that when they are emphasised, or even recorded, these details loom larger than they ought, and rather spoil the balance; not because they are anything more than commonplace, but just because they are commonplace.

What had to be brought out was that Crookes, by his own exertions, did achieve a sufficient fortune to enable him to devote the main part of his life to science. Details of the fees which he received in consultation or in legal procedure, after he had established his reputation, are utterly unimportant and should be out of the picture; they distract attention from the real business of life. Financial matters which lead to disaster, or which lead on the other hand to increased facility for work, are bound to be included; but unnecessary details about minor things of that sort are abhorrent.

The main outlines of what one would look for in the biography of a man of science, after dates and parentage or ancestry and educational opportunities, are such as these:—the circumstances which led him to take up science as a profession or a hobby, some account of his early struggles and gaining of recognition, and then a vivid representation, with contemporary documents, illustrating the main work of his life. For the carrying out of such a task in the case of William Crookes Dr. Fournier d'Albe seemed eminently suitable; for he had graduated, so to speak, either literally or metaphorically, in both physics and psychics, and was sufficiently acquainted with chemistry to appreciate the work of a great chemist. But in spite of a brave, and no doubt earnest, effort to overcome the difficulties of the task, the result must be regarded as somewhat disappointing: the outcome strikes a reader who knew Crookes and his work as rather less than fair to his memory. Superlatives are introduced from time to time, no doubt; some more, some less appropriate; but it can in no sense be called a panegyric. Possibly the biographer had not

much personal acquaintance with the subject of his memoir in his study and laboratory. Undoubtedly it must be very difficult to form an estimate of a man from a miscellaneous array of letters and documents. From that point of view, the wonder is that it has been done so well.

This reviewer's own personal estimate of Crookes is sufficiently indicated in the introduction which he wrote for Dr. Fournier's book; and it is unnecessary to add to that. He would only like to testify of his own knowledge, what the book perhaps sufficiently indicates, that the mutual devotion of Crookes and his wife can hardly be exaggerated; that they lived to celebrate the sixtieth anniversary of their union; and that when she died he was inconsolable until he obtained what he considered proof of her continued companionship.

Some remarks must now be made concerning a few of the chemico-physical and psychic details recorded in this volume. On the whole Crookes was more of a chemist than a physicist. His training had been that of a chemist; and although he made important discoveries in physics, he generally stated them in such a way as to arouse opposition and controversy. Controversy indeed ruled throughout his life, sometimes taking a painful form. One of the most painful controversies must have been that at the Royal Institution with Sir James Dewar. It is mentioned in this review only to bring forward a privately known proof of Crookes's magnanimity: for when, soon afterwards, it was proposed at the Royal Society that its highest honour, the Copley Medal, should be given to Dewar, Crookes, a previous recipient of that medal, came out of his comparative retirement and earnestly supported the proposition; which, needless to say, was carried.

The chief discoveries associated with Crookes's name are the new element Thallium,—discovered spectroscopically and exhibited at the 1862 Exhibition, though even about that there was much vexatious controversy; the radiometer,—again with much disagreement about its mode of action; the spinthariscopes,—a useful and convenient and, as it turns out, important outcome of experiments on radium; and, chief of all, radiant matter or cathode rays or "matter in a fourth state,"—the foundation of a whole new branch of physics, and

the early beginning of the later discovery by others of the electron. It will probably be held by posterity that the electrical work in high vacua, part of which was summarised and demonstrated in his discourse to the British Association at Sheffield on August 22nd, 1879, marks the climax of Crookes's life and achievement.

The discourse itself was rather brilliant, and passages from it are quoted in this volume, but the experiments in high vacua, by which it was illustrated, were far more brilliant; and it is difficult to over-estimate their great and epoch-making importance. From a sort of toy, exhibited at scientific soirées, the vacuum-tube rose to a position of extraordinary dignity and usefulness, and may be said to dominate the physics of the latter portion of the nineteenth and the early part of the twentieth century.

Members of the S.P.R. will be able to form a good estimate of the main outlines of Crookes's work by reading the obituary notice by a contemporary man of science, Sir William Barrett, in *Proceedings*, (Vol. XXXI., pp. 12 to 29), with a portrait and with a useful appendix giving a list of the contributions to the S.P.R. by Sir William Crookes.

So far, we have said not a word about that painful and unpopular episode or period in Crookes's life wherein he took full advantage of exceptional opportunities offered him for the examination of supernormal phenomena, during the years 1871 to 1874, a period of great importance to the disciples of psychic science, and one in connexion with which they will always hold Crookes and his pioneering work in high honour and remembrance. But, as often happens to investigators into unpopular novelties, the work brought upon himself, as far as the public were concerned, only ridicule, painful controversy, and condemnation. He entered upon the subject with a light heart, he left it with a heavy one. He imagined that by careful experimenting, and by frankness, he would disarm hostility and convince the scientific world. Others have been under a similar impression, both before and since! We now know, or at least the writer does, that Crookes observed many things which, however incredible, were true; and that, by aid of the unusual powers of D. D. Home

and Florence Cook, he had opportunities for investigation denied to most of us. But the citadel of orthodoxy was too strong; Crookes failed to storm it; it is intact to this day, though breaches have been made in its wall, or at any rate some of the garrison have deserted. But for the rest of his life—though he would willingly speak privately on the subject, and though his convictions were quite unaltered,—he no longer thought it necessary to incur the odium and the numerous disabilities incurred by pressing the subject on his scientific confrères. So, after a vigorous and stormy few years, he went on with what he considered his scientific work proper, and therein achieved so much that, in spite of the hostility he had aroused, scientific honours and medals flowed upon him; and ultimately he was even elected, though not without some searchings of heart, to the Presidency of the Royal Society.

Undoubtedly the researches of Crookes into psycho-physical phenomena must have been among the material which was in the minds of the founders of the S.P.R., when in the late seventies and early eighties, Sir William Barrett (the only remaining living founder) discussed with Henry Sidgwick, Frederic Myers, and Edmund Gurney, together with Alfred Russel Wallace and probably some others, the prospects of a society which might be founded to take up that large and neglected field of investigation to the very existence of which the long established scientific societies were blind and deaf when not contemptuous. Fortunately, or so it seems, the first fruits of the Society, and indeed of Barrett's own work on the subject, lay in the comparatively innocuous and less sensational direction of the kind of thought transference to which Myers gave the name "telepathy." Crookes indeed, later in life, rather regretted that his good fortune had not led him to *approach* the subject from that end. At the same time the more physical end seemed natural to an experimenter in chemistry and physics: and he probably had too little training in psychology and literature to be able to make the headway which the co-operators who founded the Society did undoubtedly make. Nevertheless, physical phenomena are among those occurrences which had been testified to again and again; and they were by no means excluded from the purview of the new Society. Indeed a special committee was initiated from

the first to try to carry on and complete the investigation begun by the Dialectical Society in the previous decade. And if opportunity had offered, they would doubtless have been willing to continue and develop the observations of Crookes.

Even telepathy, however, would not have been acceptable to the scientific magnates of that day. There are still some to whom it is not acceptable now. And Barrett encountered hostility when, in 1876, he tried to read a paper on the subject before a scientific body, and offered to make demonstration of the telepathic powers possessed by members of a family with whom he himself had made careful observations.

The best known of Crookes's experiments, and those which caused the most outcry and derision, were the remarkable series of experiments in full blown materialisation,—for a scientific treatment of which the time was evidently not yet ripe. The Florence Cook and Katie King episodes are not fully described in this volume. A fuller extract from the records of the time is given by Dr. Fournier d'Albe himself in his book, published by Longmans in 1908, *New Light on Immortality*, Chapters 2 and 3 of Part III.,—a book which is well worth referring to; though it contains statements by Mrs. Ross Church (Florence Marryat) which cannot be credited, and to some of which Crookes himself later gave unqualified denial. (See *Proc. S.P.R.*, XII., p. 268.)

Crookes was the victim not so much of controversy as of sheer denunciation; his most voluble antagonist being Dr. W. B. Carpenter, one of the learned physiologists of the time, who was subsequently Registrar of the University of London,—a man of weight and influence, but, as is now seen, of far less than scientific caution and fairmindedness. Another antagonist was the eminent man of science Sir Charles Wheatstone, to whose inventions the early progress of telegraphy owed so much. On the other hand there were one or two who had already become convinced of some of the facts, not only the famous biologist, A. R. Wallace, but the well-known electricians Cromwell, and his brother S. A. Varley; who indeed encouraged Crookes to take up the subject, and assisted him in some of his early experiments with Home,—making, among others, an electrical test which, though not really more conclusive than

mechanical ones, might appear more conclusive to the public mind. S. A. Varley was a man for whose contributions to cable telegraphy Lord Kelvin in later life frequently asserted that he had not received a due meed of recognition and approbation. That by the way; and only as showing, to a generation which has now nearly forgotten these workers, that their experimental ability was by no means to be despised.

There were others, of course, not so exactly in the line of scientific ancestry, who countenanced these phenomena and were fully convinced of their reality. And perhaps it was partly due to association with these that Crookes—already recognised as a discoverer—conceived that when he found himself able to add his own first-hand testimony, and utilise the exceptionally favourable opportunities which then prevailed, his word would be received and opposition would crumble. Wisely, he made selection of what he thought would be palatable material; he did not seek to interest the officers of the Royal Society—chief among whom was the world-famous mathematical physicist Sir George Gabriel Stokes—in any of the strange and ultra-normal physiological and apparitional phenomena which he had witnessed; but he did seek to make a demonstration of the powers of Home, reduced to their bare elements, by means of a very simple mechanical arrangement for proving the existence of an unknown force, which he called “psychic force.” This experiment he begged both Stokes and Wheatstone to come to see; but they declined, saying that if the arrangements were really as he described them, the thing could not possibly work. To this Crookes replied that he did not say the thing was possible or likely, but only that it happened. He succeeded in getting Dr. Huggins, the astronomer, to see the apparatus working, and also to be present while an accordion, held in Home’s hand by its dummy end in a cage, with its keyboard hanging down, moved about and sounded its notes. But Sir William Huggins refrained from *conspicuously* championing the phenomenon, and preferred for a considerable time to remain anonymous, at least so far as the public were concerned. He, however, was not one of the officials of the Royal Society at the time, though subsequently, in due time, he became its President.

All this, with many other details, appears more or less

clearly in Chapter XII. of the book under review,—a long chapter dealing with this phase in Crookes's life,—and it is unnecessary to say more about it here; except regretfully to say that the author's treatment in a few particulars is not altogether fair to Crookes's memory, and not such as Crookes in his lifetime would have approved. Certain metrical statements by Crookes are stigmatised as erroneous, while the still more erroneous statements of objectors are cited without correction as if they were true. There must have been a certain amount of carelessness in this part of the book; and the genuineness of the whole affair appears to be left under a cloud of suspicion which is very far from being justified by the statements themselves, and which by no means correctly represents the attitude of Crookes himself at any part of his life.

In this review, therefore, it seems desirable to call attention to the particularly simple experiment above mentioned, and point out some of the gratuitous errors which, judging from the text, were made at that time by critics of importance. Unimportant and anonymous critics did not hesitate to ridicule the whole thing; that is only to be expected, and is of no moment, but what responsible scientific authorities say, at any period, is historically important, and, if uncorrected, is naturally taken as accurate. The following remarks, therefore, may serve as a summary and supplement to this part of the book.

Crookes arranged an apparatus of the simplest possible kind in order to verify that an unknown force actually operated, and in some sense to record and measure its amount. For this purpose he arranged a horizontal mahogany board three feet long,  $8\frac{1}{2}$  inches wide, and 1 inch thick; with one edge supported on the edge of a table, and the other end suspended by a registering spring-balance, hung from a firm tripod stand. The medium was seated at the table and his hands were placed lightly on the fixed or fulcrum end. The result was that after a time the board tilted down, and the balance at the other end indicated that its spiral spring had been stretched as if loaded by a weight, sometimes as much as from 3 to 6 lbs. He also made a registering apparatus, with smoked glass moved by clockwork, so that a trace should be recorded, indicating by objective and permanent record the amount of the force at different times. All this was published



in *The Quarterly Journal for Science* for July 1871, and continued in October 1871, with confirmatory testimony by Sir William Huggins and Serjeant Cox. The testimony was later reproduced, with an appendix of correspondence illustrating the controversial reception the experiment met with, in a book called *Researches in Spiritualism*, which appears to be now out of print.

These experiments are referred to in the volume now under review, page 218 and thereabouts. To avoid the suspicion that the medium, when touching the board, might trespass beyond the fulcrum and be surreptitiously pressing with exceptional violence, so as to produce a force comparable to a pound weight or more at the far end of the lever, Crookes marked the position of Home's fingers on the board, and subsequently placed on or near the fulcrum a vessel of water, into which the medium was to dip his fingers without touching the board at all. And to avoid accidentally or purposely touching the rim or sides of this vessel, he arranged above it another water container, a sort of copper bowl, fixed to an independent support; the bowl being (unfortunately and perhaps unnecessarily) perforated at the bottom so that water in the bowl communicated with the water in the vessel below; and the medium only dipped his fingers into this upper copper bowl, shown in an illustration on page 220 of the book. But still the spring balance at the far end of the lever, now untouched except through water, exhibited a force of nearly a pound.

The most absurd arguments were used against these experiments. For instance, a writer in the *Journal of the Franklin Institute* says that, though Crookes's evidence practically shows that the board apparently weighed only 6 lbs., it ought, from its size and from the specific gravity of mahogany, to weigh 13 lbs.; he therefore indicates a suspicion that the board was a trick board, supplied by the medium! To which Crookes replied that the board had been in his possession for years, that it had already formed part of several previous pieces of apparatus, and that, whatever it *ought* to weigh, it did actually weigh only 6 lbs.

Another objection, more responsibly made by Sir Charles Wheatstone, was that a water connection was no guarantee

against the exertion of force, since—so he argues—if only 3 cubic inches of water were displaced by the fingers, it would by hydrostatic laws be equivalent to a pressure of from 12 to 13 ozs., or nearly a pound. This arithmetical error is reproduced on p. 219 of *The Life of Crookes* without correction. As a matter of fact the weight of three cubic inches of water is only an ounce and threequarters! This matter, though apparently trivial, is historically important because a special effort was being made to interest the Royal Society. In its early days the opportunity for witnessing such an “absurd” experiment would have been welcomed by the Society; but now, in its later dignity and immense knowledge, it is repelled by the apparently impossible. Crookes is accused by his biographer of having, in this crucial instance, made a *faux pas*, with serious consequences to Science. It is not really so: though in his original description he probably had a momentary lapse, and had expressed himself with less than meticulous accuracy. He was not a professor of Physics. When he came to reply to objections, he might have admitted the hydrostatic argument and at the same time attacked the erroneous arithmetic; but, instead, he contented himself with a demonstration that as a matter of fact no appreciable deflexion of the lever could normally be caused in that way, even when the bowl was not exactly over the fulcrum. Crookes expressly states that dipping his whole hand to the full extent in the upper bowl of water did not produce the least appreciable action on the balance at the other end of the lever. This is in accordance with common sense. The whole weight of a man *on the fulcrum* would not account for the stretching of the spring. That the weight of whatever water was displaced would give some extra pressure on the fulcrum is true enough, but that this effect would be very small is obvious from the picture of the apparatus, and nothing appreciable could normally reach the far end of the lever.

Wheatstone's concluding comment, when this was pointed out, was that it appeared to him contrary to all analogy that any force, acting according to physical laws, should produce the forcible depression of a lever by acting on its fulcrum! To which Crookes replied that he entirely agreed; that that

was the whole gist of the experiment, and the only reason he regarded it as worthy of attention.

The episode illustrates one of the difficulties which is bound to be encountered by investigators of novel physical phenomena. If a new kind of force is exerted, the experiments are almost bound to be surprising and, so to speak, incredible—so incredible that responsible leaders in science may be unwilling to subject themselves to what they regard as the farce of attempted demonstration. As in Galileo's time, they may refuse to look through the telescope; or, if they do, may regard it as a deceptive instrument. Many Continental investigators, and some in this country, are now inclined to suppose that the force in these and other more striking instances of telekinesis is due to or is associated with the mechanical intervention or employment of an invisible previously unknown material, probably emanating from the medium, in the form of what we now call ectoplasm,—a form of substance which was then not recognised or perhaps suspected by anyone. Nothing but direct observation and instrumental confirmation can establish such things as realities; and in the absence of theory experiment must always be scrutinised with exceptional severity. A plausible theory need not jump into existence at the same time as new facts are observed; but until there is *some* guiding theory or clue the facts seem detached from organised science, and are rebutted and disbelieved on theoretical grounds. Disbelief is only natural, and its foundation in common sense is rather like a modified version of David Hume's arguments against miracles, viz. that it is more likely that a witness should lie than that a miracle should happen; because the one is consonant with human experience and the other is not. That is quite true; but if the thing really does happen, and if it can be shown contemporaneously to happen, the argument has no weight; the facts, when proven, are themselves an expansion of human experience; and they clearly establish the need for overhauling and enlarging our theoretical foundations. Things that are unlikely may nevertheless be true. Our knowledge of nature is not so extensive that we are able to say beforehand what is possible and what is not possible in a novel region of enquiry. That is where even Faraday—that prince of investigators—made, in an *obiter*

*dictum*, one of his few mistakes. The history of science is too much disfigured by the premature rejection and contempt with which novelties have often been received. They are accepted, in the long run, by some subsequent generation; but the responsible generation living at the time does not rise to the height of its opportunities. Contemporary men of science unfortunately write themselves down, not only as ignorant, which was inevitable, but as blind and prejudiced and sadly bigoted: though it is true that in their lifetime their contemptuous attitude gains them credit for robust common sense and sanity. They are wise, therefore, in their day and generation.

It is singular, and perhaps depressing, that the obscurantist attitude of theologians in the past had been so amply imitated by the pontiffs and high priests of science in the recent present. They still oppose their admirable theories and great knowledge of the universe to resist the incursion of fresh information; they oppose observed facts on *a priori* and utterly inadequate grounds. No one ought to consider his knowledge of the universe so complete and final as to be competent to negative careful testimony based on critical and responsible experiment and observation, especially if the observer has already proved his competence in more recognised branches of knowledge. Explanatory hypotheses may be criticised severely, but the facts demand attention.

In the light of our present or subsequent knowledge, historical rejections of truth, and inability to recognise the value of testimony, or even to accept a chance of being convinced by actual experience, tend to arouse our impatience; but there is some excuse. Most of the orthodox facts of to-day had to encounter similar opposition at their entry, and were at one time heterodox. It has been said that even scientific fact is not generally accepted until it becomes a habit: and, as illustrating pardonable and natural scientific scepticism, it may be instructive and helpful to quote here from an old letter from a scientific friend about Crookes's experiments, preserved and cited with approbation by Crookes himself:—

“Any *intellectual* reply to your facts I cannot see. Yet it is a curious fact that even I, with all my tendency and desire to believe spiritualistically, and with all my faith in your power of observing and your thorough truthfulness,

feel as if I wanted to see for myself; and it is quite painful to me to think how much more proof I want. Painful, I say, because I see that it is not reason which convinces a man, unless a fact is repeated so frequently that the impression becomes like a habit of mind, an old acquaintance, a thing known so long that it cannot be doubted. This is a curious phase of man's mind, and it is remarkably strong in scientific men,—stronger than in others, I think. For this reason we must not always call a man dishonest because he does not yield to evidence for a long time. The old wall of belief must be broken down by much battering."

The fact that Crookes fully adhered to his exceptional experiences, throughout his life, is sufficiently plain to members of the S.P.R. from his "Notes of Séances with D.D. Home," written for the *Proceedings* of the S.P.R. in 1889 (see Vol. VI., page 98 *et seq.*). Also from his holding the Presidential Chair of the Society for three years, 1896-1899, and from his Presidential Address to the Society in 1897 (see *Proc.* Vol. XII., page 338).

While, later still, in the critical and quite unprivileged atmosphere of the British Association, when he was President of that body at its Bristol meeting in September 1898, the concluding portion of his address speaks of "one interest" which to him was "the weightiest and the farthest reaching of all," and continues:—

"Thirty years have passed since I published an account of experiments tending to show that outside our scientific knowledge there exists a Force exercised by intelligence differing from the ordinary intelligence common to mortals.... To ignore the subject would be an act of cowardice—an act of cowardice I feel no temptation to commit.... There is nothing for the investigator to do but to go straight on.... to follow the light wherever it may lead.... I have nothing to retract. I adhere to my already published statements. Indeed, I might add much thereto. I regret only a certain crudity in those early expositions which, no doubt justly, militated against their acceptance by the scientific world."

Though several letters about the preparation of this Address are printed in the volume under review, pp. 353-370, it seems

legitimate to add, now, that while drafting the address Crookes was also in correspondence with F. W. H. Myers; and we may trace Myers's hand in its final and ante-penultimate paragraphs. I know that Crookes accepted these suggestions with joy, and rejected several other eloquent literary passages with regret. It is only fair to his memory to quote here the final paragraph; though it is among those quoted in the book, and although Members of the S.P.R. will find the whole of the psychic portion of this British Association Address easy to refer to in *Proc. XIV.*, pp. 2 to 5.

"In old Egyptian days a well known inscription was carved over the portal of the temple of Isis: 'I am whatever hath been, is, or ever will be; and my veil no man hath yet lifted.' Not thus do modern seekers after truth confront Nature—the word that stands for the baffling mysteries of the universe. Steadily, unflinchingly, we strive to pierce the inmost heart of Nature, from what she is to re-construct what she has been, and to prophesy what she yet shall be. Veil after veil we have lifted, and her face grows more beautiful, august, and wonderful, with every barrier that is withdrawn."